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Public Acceptance Challenges for Onshore CO_2 Storage in Barendrecht

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Abstract

At the request of the Dutch government Shell has been preparing for a possible CO_2 storage project in the town of Barendrecht since 2007. The project involves transport and storage of pure CO_2 produced at the Shell Pernis refinery (a by-product from hydrogen production) through 20 km of pipeline and into two depleted gas fields. Because this is a densely populated area public acceptance was recognised from the start as the key challenge for the project. This paper will describe the key elements of a comprehensive public acceptance strategy, and also a frank analysis of what went well and what didn't go well on the Barendrecht project.

Keywords; Public Acceptance; stakeholder engagement; communication; value proposition; risk communication; local benefits.

1. Introduction

It is important to be aware that many CCS projects at the moment are the result of a public tender process in which government agencies select projects that they want to support financially. The whole 'design' of the project is influenced and decided on not only by the company executing the project but also very strongly by the authorities who define the tender specification, selection criteria, and ultimately select the projects that get funding and therefore go ahead. This paper will focus on public acceptance from a company's perspective. One of the key learnings from the Barendrecht project is that in case of publicly co-funded projects it is essential that the authorities and the companies involved work together very closely from the start in developing a public acceptance strategy. Where this is particularly relevant it will be noted in this paper.

The set-up of this paper is fairly generic and therefore applicable to CCS projects in general. However, because of the specific characteristics of the Barendrecht project the emphasis and most learnings will be on the transport and storage part of the CCS chain, on the early phases of a project, on external acceptance (although acceptance within the company can also be a challenge and should not be forgotten) and on local acceptance from the direct neighbors of the project. Local acceptance cannot be addressed in isolation of broader, often political issues. In the Netherlands opinions on the need for CCS are still hotly debated within and between different organizations like political parties, knowledge institutes and NGO's. As a result there are many stakeholders with an interest in the success or failure of demonstration projects.

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This paper will describe the main steps in developing a comprehensive public acceptance strategy:

- Understanding the Playing Field: this is basically the outside environment in which the project will be realized; it needs to be thoroughly understood to be able to set up an effective public acceptance and communication plan; it defines the level of readiness and support of the key stakeholders for CCS in general and for the project in specific.
- Defining the Local Value Proposition: a comprehensive inventarisation and assessment of all the pro's and con's of the project from a local stakeholder and neighbor's perspective.
- When the playing field and the local value proposition are understood, sufficient information is available to set up a Public Acceptance Strategy; typically this should include activities to improve the playing field, to improve the local value proposition, and to effectively communicate and engage with stakeholders.

Finally, it is important to note that the recommended steps as described in this paper were not always followed for the Barendrecht project – the project was and is a pathfinder and one of its objectives is to learn. Various 'after-action' reviews have been done on the communication around the Barendrecht project and the conclusions on the main lessons to be learnt have been reflected in this paper.

2. The Playing Field

Figure 1 shows the key elements of the playing field that need to be understood in order to define an effective public acceptance strategy. Below, the importance for public acceptance of each of these elements is described and some comments are made on the Barendrecht situation.

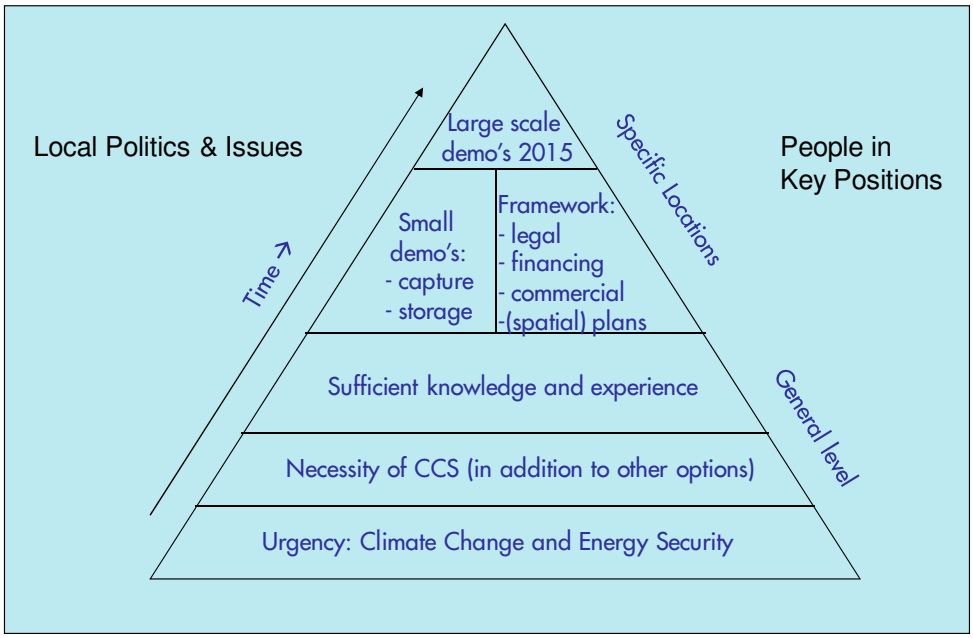

Figure 1 The Playing Field

A general comment that is relevant for all elements is that the Barendrecht project was started in 2006 and communication with local stakeholders in 2007. Awareness of climate change was relatively high due to the "Al Gore – Inconvenient Truth" impact, and there was energy and money to commence new projects. Four years later we have had 'Climate Gate' scandals, an economic crisis and the Dutch government has fallen.

These external developments will always happen. Therefore any description of the playing field will by definition be a snapshot in time, and will require regular updating.

a. Climate change and energy security: a general understanding and acceptance is required that with current practices we risk serious problems due to climate change and/or the security of energy supply. People who do not accept this will not support spending (public) money on CCS projects.
Barendrecht: in general people in The Netherlands are aware of the issue of climate change and are starting to understand the link to the issue of energy security. However, surveys also show that the Dutch are among the most skeptical people in the EU and most inclined to think that the problem (climate change) is being exaggerated. More recently the economic crisis has given people an incentive, and the climate-gate scandals an excuse to become less concerned about climate change.

b. The need for and benefits of CCS: in Shell we think that all options should be considered and developed in order to address the issues of climate change and energy security, so: energy efficiency AND renewable energy AND CCS. People who do not think CCS is needed or who do not think CCS will be effective will not be supportive of demo-projects. This is the position of some NGO's and also some political parties.
Barendrecht: several system-studies had been published showing that the most cost-effective way to meet challenging CO_2-reduction targets would be a combination of different measures, including CCS. Experts in the relevant ministries, knowledge institutes, political parties, universities and companies all seemed to agree. However, this consensus turned out to be rather superficial. At the first signs of local resistance opinions started to diverge. In retrospect this is not difficult to explain as both the width and depth of discussions before 2007 were in general quite limited:
- very few people were involved in discussions around the need for CCS before 2006; for example, there was only one person involved at national level (Ministries) at the time the original tender for storage demo-projects was issued in 2007.
- discussions before 2007 tended to be fairly academic and high-level; as soon as the discussion moved from general issues to a specific storage location this changed. Many people started thinking seriously about CCS for the first time. Media started giving attention to the topic. Local resistance and lobby activities caused a re-think with those already involved.

c. Sufficient knowledge and experience: in order to start industrial scale demonstration projects there needs to be consensus that the key players involved have sufficient knowledge and experience to execute such a project safely. This is a very important but difficult issue from a communications perspective. CCS is a new development, so by definition there will be 'new' aspects to a demo-project. For opponents anything 'new' is also quickly something uncertain and risky. People who do not think there is sufficient knowledge or experience yet will not be supportive of onshore demo-projects and will prefer further laboratory work and/or very small scale testing.
Barendrecht: in the Netherlands the expert community is connected through the CATO programme. In this community there was fairly broad consensus that, from a technical and safety perspective, there was enough research done and practical experience available (with CO_2-EOR, gas storage and CO_2 transport) to move to industrial scale demo-projects. Nevertheless, the general public's impression over the last few years is probably that the scientific community is divided on this issue. This unfavorable picture could develop for three reasons:
- critical scientists are not difficult to find for a controversial issue like CO_2 storage. Several of these scientists were even willing to criticize aspects of the project which were not part of their actual area of expertise.
- the scientific community in CATO has traditionally been quite reluctant to get involved in public discussions on CCS as these discussions sometimes have a political angle and/or commercial interests are involved. This is now slowly changing with CATO getting more involved with communication activities and sharing knowledge.
- media stories (about local concerns) benefitted in general more from interviewing or quoting scientists that claimed the project was risky than those who said it was safe.

d. The maturity of the existing legal and commercial frameworks: local stakeholders are more likely to accept a new activity if current legislation and regulations are adequate for making sure the activity does not threaten their safety and that damage compensation laws will cover any 3rd party damage. Examples of relevant regulations for CCS activities include guidelines for external safety calculations for CO_2 leaks, containment demonstration guidelines, monitoring requirements, financial securities requirements, long-term storage

management requirements. When these regulations are not clear yet this creates uncertainties for the companies carrying out the project but also for the local stakeholders.

Barendrecht: when the Barendrecht project started the framework was in principle sufficiently developed: the Dutch mining law did cater already for the possibility of CO_2 storage, the AMESCO study had defined the requirements for an Environmental Impact Assessment (EIA) for storage, and external safety regulations for hazardous installations could also be used for CO_2 transport and storage (voluntarily). On the other hand, none of these regulations had CO_2 storage in mind when developed and therefore were often 'not blocking' CCS rather than actively regulating it. Many of the missing elements are currently being addressed in the implementation of the EU CCS directive and also in the new Dutch requirements for pipelines and external safety. In the meantime Shell used their own standards in developing the design and monitoring plan for this project. adopting a conservative approach in order to always err on the safe side. Nevertheless, self-imposed standards by large companies, even when more stringent, always create less confidence with stakeholders than government imposed standards.

e. Small demonstration projects: for various reasons it is good practice to scale up project size gradually so that confidence can be gained at an acceptable level of risk (technical, commercial, reputation). For the same reason it is also good to do tests with uncertain outcomes (e.g. CO_2 storage in shallow aquifers) further away from populated areas and only move to more populated areas when there is sufficient confidence in safe and permanent storage.

Barendrecht: the Dutch government had made available relatively small subsidies for a number of small scale capture and storage demo's. As there was already a successful offshore demo-project (K12) and as half of the Dutch storage capacity is onshore it was decided that the next demo-projects should be onshore. Shell further decided that both from a learning perspective and from a public acceptance perspective it would be very good to start with a very small field (the first Barendrecht field will be 'full' in 3 years). It will allow an early test of regulations for field-abandonment, post-abandonment monitoring and hand-over procedures to the authorities for long-term monitoring. The latter is important for commercial reasons but also for public acceptance reasons; neighbors want to know more in detail what happens after the field has been filled up. Unfortunately, hardly anyone in the Netherlands knew about the existing offshore project, nor about other operational projects worldwide or about the 30+ years (and thousands of injection wells) of experience with CO_2-injection in North America. This made it easy for opponents of the project to paint a picture of a complete new and risky technique being tested for the very first time right under a densely populated area. The word 'experiment' was used repeatedly. This, in combination with the seemingly divided scientific community (see c), made it difficult to get acceptance for the message that the techniques that were going to be used were all safe and proven.

f. Large scale demonstration projects: small scale demonstration projects are done to prepare the way for larger scale demo-projects. Public acceptance for these small scale demo's will therefore also depend on the public acceptance for the projects that will follow. This links closely to the discussion under a, b and c. In general it means that people need to understand the need for large scale deployment of CCS.

Barendrecht: the Barendrecht project will store pure CO_2 from an existing hydrogen plant at the Pernis refinery. As such it was not that controversial and several NGO's were quite positive about this project in initial conversations. At the start of the project we therefore had hope that some of these NGO's would be willing to help us in the public debate. However, with 4 to 6 new coal-fired power plants planned in the Netherlands, it became clear fairly quickly that the Barendrecht project could also be seen as a potential enabler for these coal-fired power plants as they depended on the promise of future CO_2 capture and storage. In our experience it has been the opponents of CCS in general and of coal power plants that have been the most vocal in their opposition to the Barendrecht project. The project delays this has caused are used by opponents of CCS as evidence that CCS will not be able to deliver the necessary reductions in emissions on time.

g. Local politics and issues: it goes without saying that it is very important to understand what is going on in a local community when you want to start a new project there. Important information includes a.o. demographic data, presence (or not) of comparable activities, political color of local authorities, the popularity (or not) of local council, aldermen and mayor, key issues on the local agenda, recent history of local resistance against new plans or activities, and much more.

Barendrecht: although the people of Barendrecht are used to live next door to an industrial activity like gas production and treatment, it quickly became clear that not many people are actually aware that they are also living above a natural gas reservoir. Nevertheless, this did help in communicating the relative impacts and risks of CO_2-storage facilities (more or less the same as for gas production facilities). Gas production has peacefully co-existed with housing estates for over 10 years now. The population of Barendrecht is relatively young; many young families moved to new housing areas in the last 5 years or so. These families are concerned about the value of their property (which has already declined because of the economic crisis). It also became clear that Barendrecht had a history w.r.t. recent infrastructure projects of regional or national importance and the prevailing local view was that Barendrecht had done enough for projects of 'national importance' in recent years and therefore shouldn't host yet another activity with few if any local benefits. See also Section 3 (Local value proposition). The timing of the local elections (early 2010) was also such that the local representatives of all political parties (even those that were in favor) voted against the project because of the lack of local support.

h. People in key positions: because of the controversy these projects can create they are likely to end up on the desks of people in influential positions in the organizations involved in the decision making processes. It is important to fully understand what these people know about CCS, where they stand on the issue, what their main drivers and interests are, and who they listen to for advice.
Barendrecht: for the Barendrecht project a key challenge has been that many of the people in key positions were not very familiar yet with CCS in general and with the issues and concerns around geological storage in specific. It also took some time before the national authorities were ready to pick up their role in the communication process, communicating the need for CCS in general and the need for an early onshore project like Barendrecht in specific. It was only in 2008 that the current governmental CCS project organization was started. The Barendrecht project has nevertheless benefited from the support of people in key positions: CCS is warmly supported in the Rotterdam region in the Rotterdam Climate Initiative, and the previous government firmly believed that the Netherlands were uniquely positioned to take a leading role on CCS. It also became clear that as the political heat around the project increased several people no longer supported the project and some even turned against it.

A thorough assessment of the playing field, as described above, is essential to identify any areas that need strengthening before (or in parallel with) the start of a project. See also Section 4. With the benefits of hindsight below some of the key lessons learnt are summarised:

- Do not mistake a lack of debate for consensus; a real debate is only likely to start after specific onshore locations are named as potential storage sites; that will trigger local debate, and that will create the need for politicians to (re-)think about their position on CCS.
- Invite a scientific panel or sounding board in an early stage to comment on proposals and to engage with the public. Anticipate however, that opponents will always find scientists that will support them.
- Be clear to the authorities in an early stage on which regulations need to be in place before a project can start. And think twice about starting a project before this is actually in place.
- Make an honest assessment of which government departments, agencies, advisory bodies, you will need to progress the project, and of their current capacity (knowledge, experience, resources) to deal with a CCS project. And think twice about starting a project when capacity is lacking (depending on the size of the investment involved).
- Opponents of CCS will try to label any demo-project as a 'dangerous experiment'; from the start therefore there needs to be clear, consistent and repeated messaging on what is, and what is not being tested in the demonstration project.
- Explain and emphasize the importance of CCS for energy-intensive industries and for creating 'negative' emissions (in combination with biofuels).

3. The Local Value Proposition

After assessing the external environment and level of readiness it is important to have a closer look at the project itself and what it would bring to the local community. As mentioned before this paper will focus on the local stakeholders for the transport and storage elements of the CCS chain. Often the capture location will be too far away from the storage location to be of interest for the local community. This is an inherent weakness and challenge for CCS projects. The capture part of the chain will often generate significant activity and employment, and therefore local benefits. However, the storage part of the chain creates very little local employment or other benefits and is also perceived to have the most risk. The conclusion for onshore storage projects therefore is that it will often be a challenge to set up the project in such a way that the benefits, risks and impacts, *as perceived by the local stakeholders* are fairly distributed. The term Local Value Proposition aims to capture all the pro's and con's for the local stakeholders. Figure 2 shows the key elements of the Local Value Proposition. They will be discussed in more detail below.

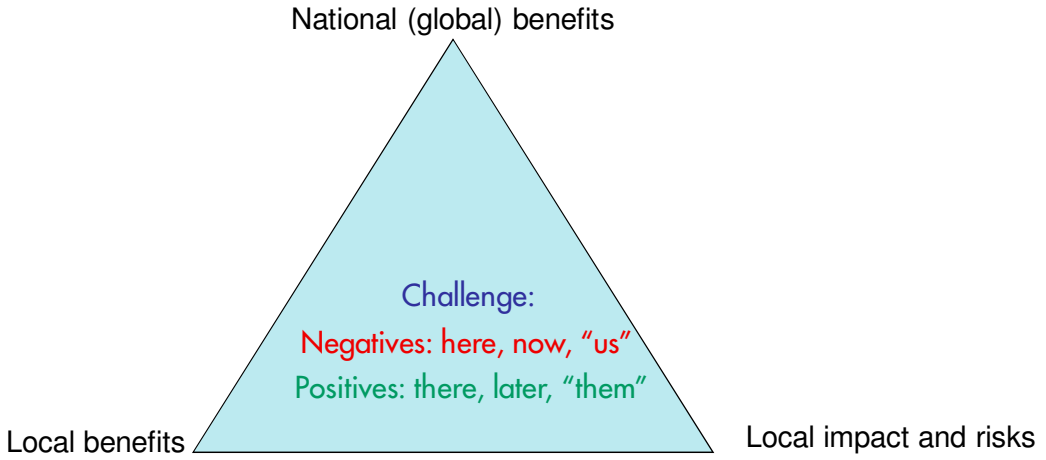

Figure 2 Local Value Proposition

a. National (global) benefits: the main argument for CCS comes from long-term scenario analyses which show that without CCS it will be much more difficult and expensive to achieve the necessary reductions in CO_2 emissions. These scenario's also show that CCS is most important for those countries that have large coal reserves. Explaining this to local neighbors of a storage project is challenging. Most people have heard of climate change and that CO_2-emissions are to blame, and they do realize action is needed. However, we found that this does not necessarily mean they will support a storage project. People who are really concerned about climate change and want to do something typically prefer other solutions (wind mills, solar panels) and do not support more coal power plants. The negative connotations associated with CO_2 as a result of the climate debate has resulted in many people thinking of CO_2 as serious, even toxic, pollution and therefore not something you want in your village. It is therefore important that the national authorities are active at an early stage in communicating why these projects are needed and what the broader and more long-term benefits will be. Ideally this should be through a broad public information and engagement campaign before location specific projects are started. Awareness raising is a long process however. For the first generation of projects it is very likely that the national/global importance of CCS projects will hardly play a direct role in the Local Value Proposition. People will look primarily at the local pro's and con's.
b. Local benefits: local benefits should include everything that is a direct or indirect benefit resulting from the execution of the project. As mentioned above, for neighbors of the storage project (or of a pipeline) the benefits from the capture part of the project will typically not be relevant. CO_2 storage in depleted gas fields does not create a lot of economic activity. The production location can easily be converted into a storage location

without much construction work. Also, the operation of the storage facility and monitoring activities will not be manpower-intensive. The storage location is fixed and equipment choices are limited and straightforward. Therefore participatory approaches (including stakeholders in design decisions) are only possible for a limited number of decisions (see c below). For the Barendrecht project we (and others) have tried to emphasize the importance of a CO_2-infrastructure for the attractiveness of the Rijnmond region in the future. For energy-intensive companies this may be a reason to invest in the area. The Barendrecht project includes an oversized pipeline that can be used in the future as part of a more extensive infrastructure. The pipeline will also enable an increase of the supply of CO_2 to the greenhouses in the region. Although these benefits are more concrete, short-term and closer to home than 'climate change' we still found that they were not very important for the direct neighbors of the project.

c. Local impact and risks: every activity or project that is carried out will have some certain impacts and some potential impacts (risks) on their direct environment. Because of the limited activities needed (see b) the certain impacts will be very limited. For the Barendrecht project this has been assessed and described in detail in the Environmental Impact Assessment (EIA). The EIA was reviewed by the independent committee for EIA's; they concluded it was a thorough and fair assessment of all impacts and risks of the project. Basically, after construction of the pipeline and compressors, and work-over of the wells, people in Barendrecht will not notice much difference from when it was a gas production location. Also the safety risks are comparable to the safety risks of a gas production facility. Safety assessment and risk assessments have also been checked by the EIA Committee, by government agencies and by other experts. Experts agree risks are limited, within legal limits, and worst case scenarios have limited impact that can be managed by existing emergency response capabilities. Nevertheless, this is the issue that has been most important in the local debate as the perceived risks were much higher than the calculated risks. This can be explained as follows:
   - Risk perception theories identify certain risk characteristics that make a risk seem bigger than it actually is, and therefore make it less likely that people will be willing to accept that risk; a few of these characteristics apply (or people think they apply) to CO_2-storage.
   - Local politicians and opponents have made repeated statements that if something would go wrong and there would be a leak that there could be a disaster.
   - There have been a number of scientists (usually not with specific expertise in the area of external safety) who have suggested that the safety calculations are not sound.

   Risk perception could benefit from a high level of participation, transparency and independent expertise for the development and execution of the monitoring plan. This will be set up with the help of CATO.

In conclusion, the Local Value Proposition for most onshore storage projects will not be very strong. The benefits are mainly for others, somewhere else and later, and the (perceived) risks and impacts are here and now. In that situation it is very difficult to convince people that even small risks should be acceptable. As local people have said repeatedly: "why should I be in favor of this project". This dilemma can be addressed in different ways. In the densely populated Netherlands, where almost all infrastructure projects meet with local resistance the government has introduced national coordination regulations that make it possible to take over some of the decision making powers of local authorities. This also applies for CO_2 storage projects. This means that, as long as the project complies with all legislation and risks are therefore acceptable, only a very limited form of local acceptance is required. In places where project go-ahead depends (legally) on support from local authorities, and in cases where local support is perceived to be more important for other reasons, it will be necessary to improve the local value proposition by either increasing the local understanding of the national benefits and (probably more importantly) by creating some local benefits. See also Section 4.

Good risk communication is very important, but unlikely to be sufficient for gaining local acceptance as CCS is a new (and controversial) topic and the technical details are too complicated for most people. This means that people will base their opinion on what they read and hear, and as Barendrecht has shown, a few scare stories can have a big impact.

4. Key Elements of a Public Acceptance Strategy

After a thorough assessment of the Playing Field and the Local Value Proposition all the information is available to define an effective Public Acceptance strategy and plan. This is not the same as a project communications plan. The public acceptance strategy will often go far beyond what is in the power of the project team or the project's team communications advisor to influence and achieve; especially when there are some serious areas of concern relating to the Playing Field or the Local Value Proposition.

A good Public Acceptance Strategy is preferably developed with all stakeholders that want to see CCS implemented and that can or should contribute to the public debate.

These parties have to agree on:

a) Actions to improve the Playing Field (where needed)
b) Actions to improve the Local Value Proposition (where needed)
c) A high level communication plan (key messages, organization, roles, planning, participation, etc)

As a company is rarely the most trusted source of information it is often preferable to let others (especially NGO's and scientists) take the lead, if they want to, in communicating general information to the public. Based on this high-level plan it is then fairly straightforward to develop the company's own communication plan.

After agreeing a Public Acceptance Strategy in principle it is important to take a step back and consider what this means for the planning of the project. E.g. if numerous actions are needed to improve the playing field, or if one of the key players is not ready yet to engage others, then it may be better to delay the start of the project until these actions have been carried out and all key players are ready to participate. E.g. in case of the Barendrecht project, Shell probably should have waited until the government was ready to communicate. Instead a decision to proceed was made to meet the required early starting date in the tender.

To give a flavor of what could be done as part of a Public Acceptance Plan just a few examples will be given below of what was and is being done on the Barendrecht project:

- NAM BV (current operator of the Barendrecht fields) initiated and chaired the Steering Committee of the so-called AMESCO study (a generic environmental impact assessment for CO_2 storage in onshore gasfields). The EIA is a critical first step in Dutch permit procedures, and therefore it was deemed important to go through this process with all parties concerned *before* specific locations had been identified. The objective was to develop together more knowledge and understanding of the information available and critical aspects for an onshore storage EIA.

- Shell Netherlands, together with the ministries involved, asked Energy Dialogue Netherlands (EDN) to organize engagement sessions to discuss with critical stakeholders their views on CCS. The objective was to get a better understanding on what the main concerns w.r.t. CCS were, and under what conditions stakeholders would support CCS. Interestingly it quickly became clear that there was broad consensus that safety was not an issue (with proper site selection and design) but that opinions were still divided on the need for CCS, the effectiveness of CCS, and the conditions under which CCS (and government funding of CCS) would be acceptable.

- The national government, with support of Shell and other stakeholders, set up a local CO_2 Information point in a local Barendrecht shopping mall in order to make it as easy as possible for people to obtain information, ask questions and give their opinion.

- CO_2 knowledge base: based on the research findings of the University of Leiden more general information on CCS was developed by a diverse group of stakeholders. The expectation is that with all these different parties agreeing the information is correct, balanced and complete, this also makes the information more trustworthy.